# The Impact of Neighborhood Electric Vehicles in California

Research conducted by
Mightycomm
for DaimlerChrysler
July - August 2005

# Neighborhood Electric Vehicles (NEVs) are here to stay

- California is the global center of the NEV universe.
- More than 15,000 NEVs are on the road today in the state.
- NEVs are street-legal, low-speed, battery-electric vehicles.
- The dominant manufacturer is Global Electric Motorcars LLC (part of DaimlerChrysler), though Ford Th!nk Neighbors, Club Car Pathway, Club Car, Dynasty IT and others are on the road.
- Sales began in 1998 and continue today, with a spike in sales from 2001 through 2003, when maximum ZEV credits were offered.

# Three surveys of NEV owners

Each examined travel behavior of small fleet and private / household NEV owners

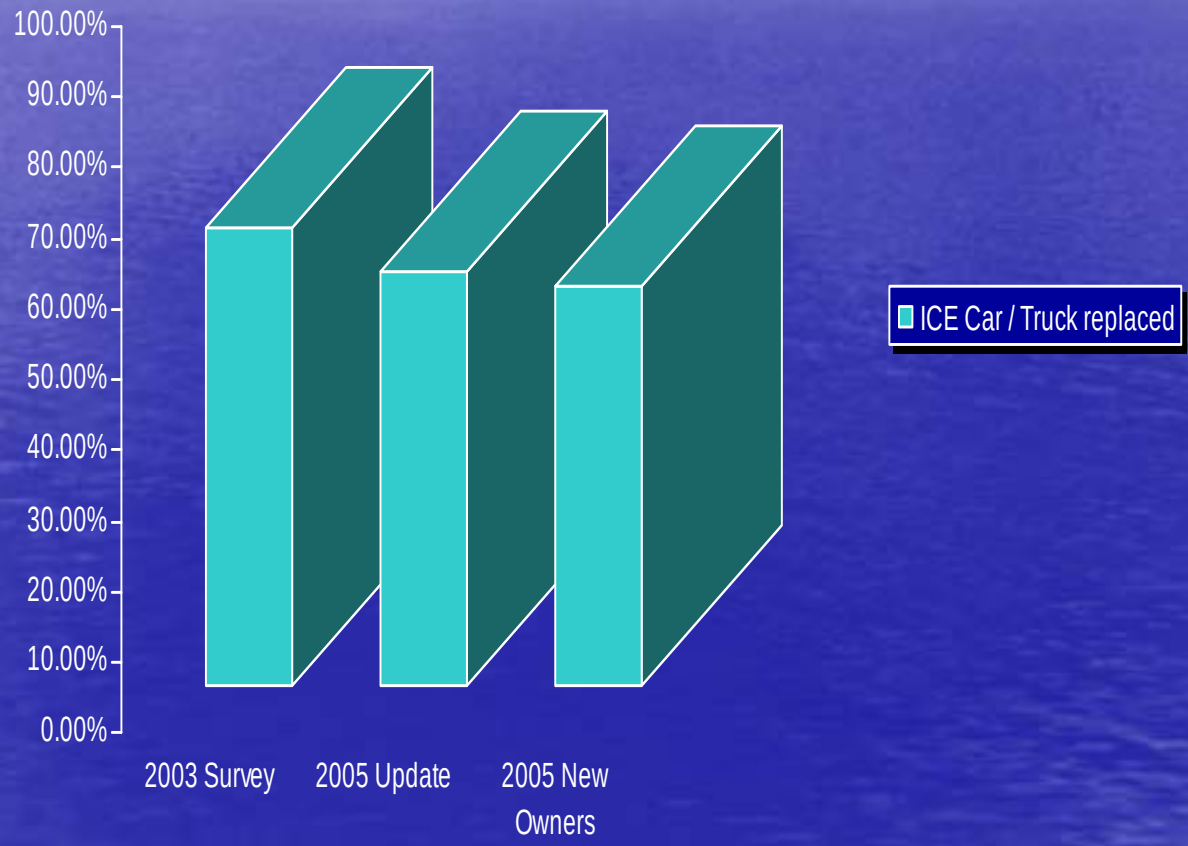
- July 2003 – Survey of 260 2001-02 model year owners
  - Most purchased their cars well below MSRP
- July 2005 – Re-survey of 2003 respondents
- August 2005 – Survey of 2005 model year owners
  - All purchased their cars near MSRP

# Highlights of survey findings

- NEVs are used every day (3.5 - 8.1 trips/day)
- NEVs replace ICE cars and trucks daily for up to three of four vehicle trips, reducing high-emission cold starts
- Three-fourths of all NEV trips are 3 miles or less; of those, two-thirds are 1 mile or less
- NEV trips are seen by owners as “trips of necessity”
- NEVs are found in a wide variety of land use classifications
- NEV user behavior is statistically consistent across the three surveys.

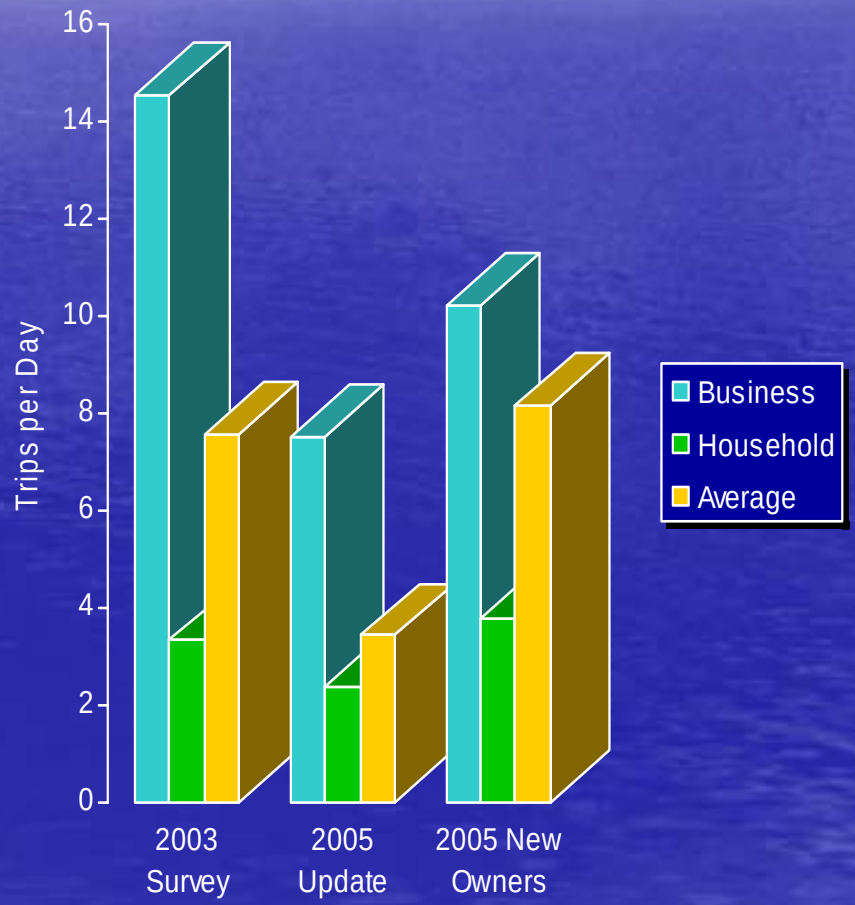
# NEV owners prefer to travel in NEVs

NEVs replace the use of cars and light trucks at least two-thirds of the time, reducing congestion and cold-start emissions

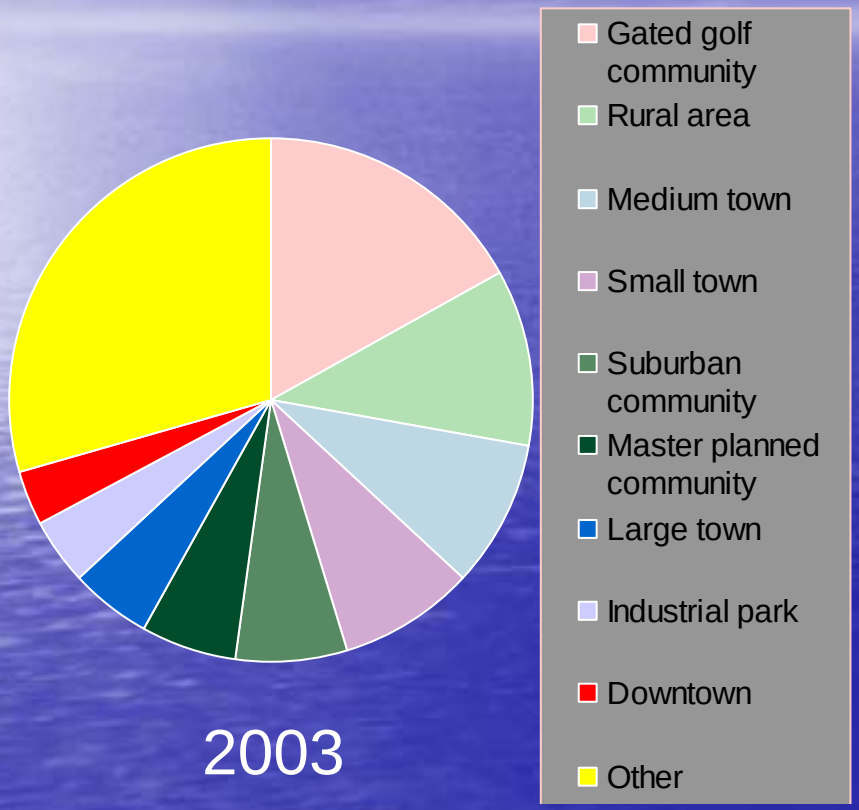


# NEV owners use their NEVs every day

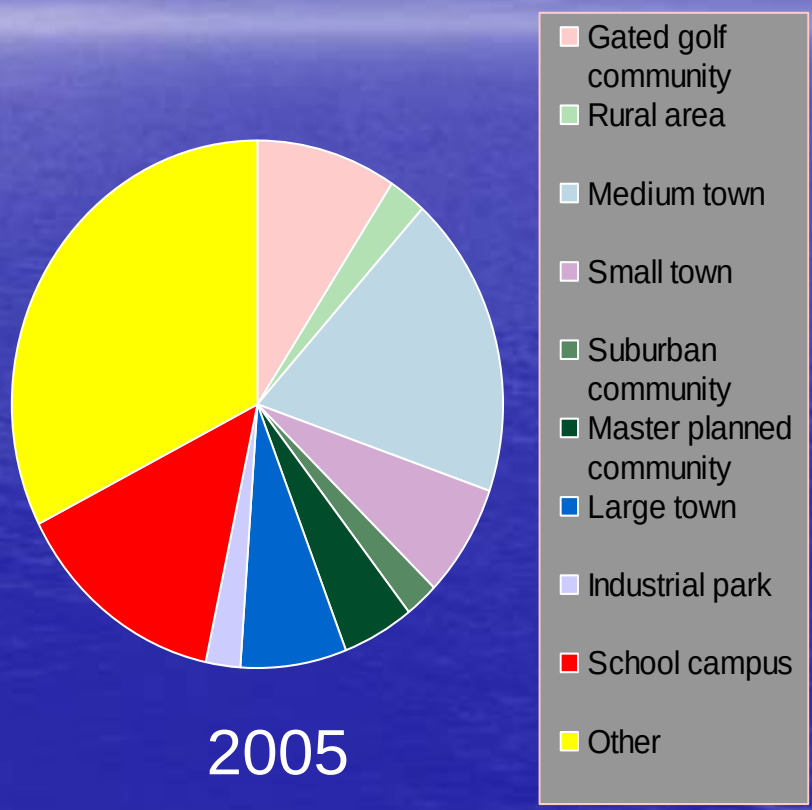
All three studies found NEVs in use every day by their owners. Business users rely on them more frequently than individual household users. Both business users and household users utilize their NEVs for multiple trips each day.



# NEVs are used in a wide array of land use settings




2003



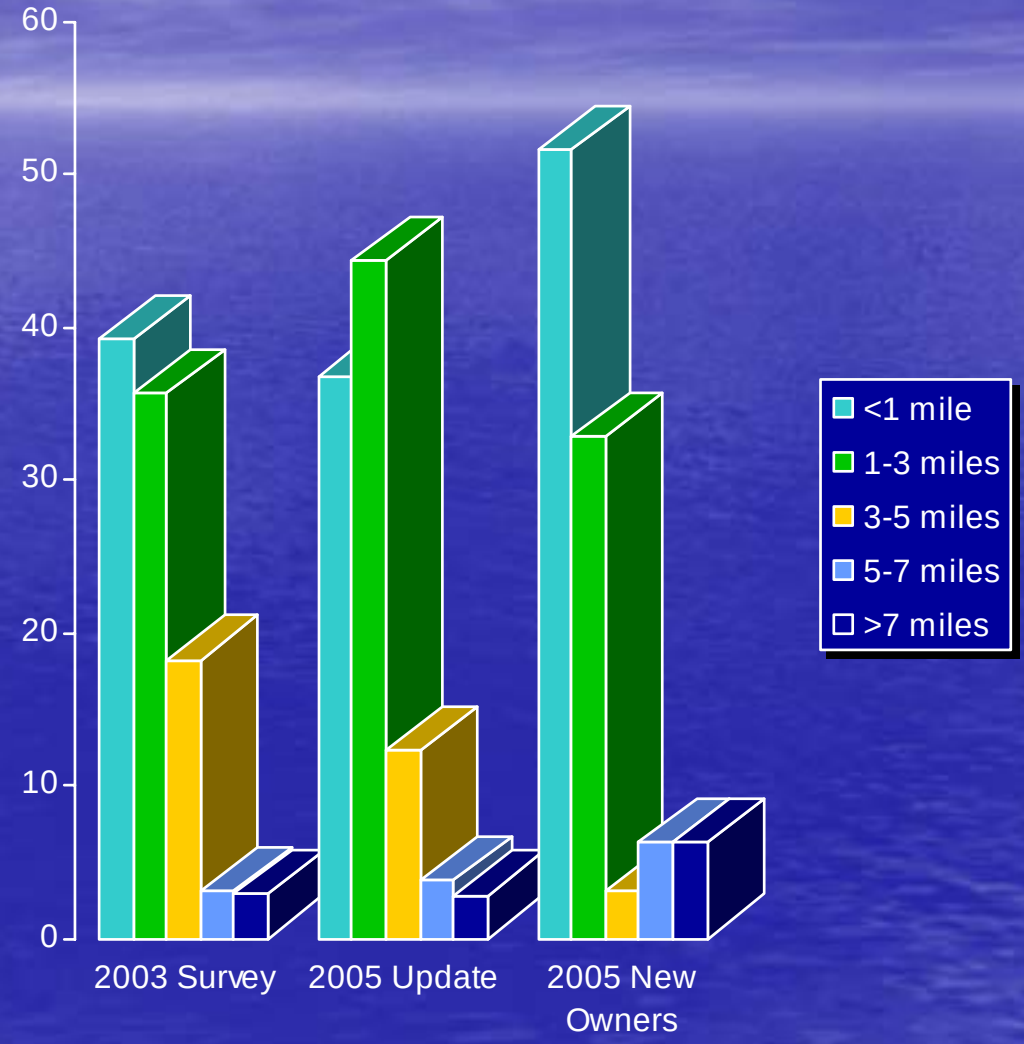

2005

# NEV users make short trips

While NEV owners live in rural, urban, dense and disbursed population centers with infinite destinations, their trip distances remain consistent and are relatively short.

**75% of all NEV trips are 3 miles or less**

**40-50% are 1 mile or less**

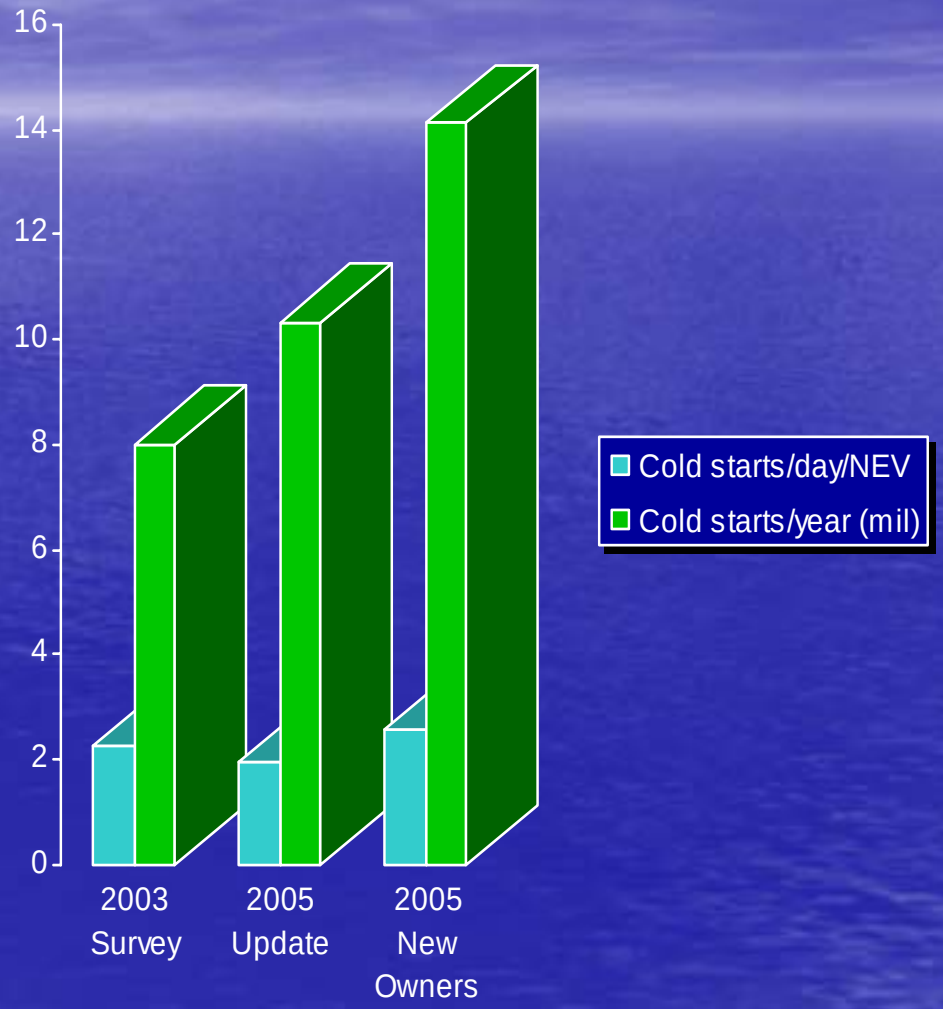


# Those short trips are important to NEV users

- NEV users make “trips of necessity.”
- NEV owners would be making these trips whether they had a NEV or not.
- “Typical trips” include business services, local errands, work mobility, visiting friends/family, recreation and many more trip types.
- NEV trips are high-occupancy – the NEV high-occupancy rate is 75% (the opposite of a typical ICE vehicle) – consistent throughout the three surveys.

# And, those NEV trips add up

- Daily cold starts eliminated by NEV use has remained consistent in all three surveys at approximately 2 per day.
- Vehicles left in the driveway when a NEV is used reflect the typical California vehicle fleet – cars, trucks, SUVs, and minivans.



# Cold start emissions

- The biggest gain in ICE emissions reduction is lowering cold start emissions.
- In general, all miles driven beyond cold start (~1mile) have minimum emissions impact for ozone precursors.

Emission Results for a 2.4L PT Cruiser certified to ULEV II

| | NMOG | | | NOx | |
|---|---|---|---|---|---|
| | gm | gm/mi | | gm | gm/mi |
| Bag 1 | 0.5928 | 0.1644 | | 0.1442 | 0.0400 |
| Bag 2 | 0.0150 | 0.0038 | | 0.0255 | 0.0065 |
| Bag 3 | 0.0335 | 0.0093 | | 0.0242 | 0.0067 |
| | | | | | |
| Weighted | | 0.0385 | | | 0.0135 |

# NEV use improves CA's air quality

| | |
|---|---|
| PZEV standards: | 0.010 gm/mi NMOG |
| | 0.02 gm/mi NOx |
| ULEV II standards: | 0.055 gm/mi NMOG |
| | 0.07 gm/mi NOx |

Vehicle emissions per year at 12,000 miles per year

| | | |
|---|---|---|
| PZEV: | 120 grams NMOG | ULEV II: 660 grams NMOG |
| | 240 grams NOx | 840 grams NOx |
| | 360 grams ozone precursors | 1500 grams ozone precursors |

Cold Start emissions saved by NEVs eliminating 2 cold starts per day over ULEV II

2 cold starts/day * 350 days * 0.5928 NMOG grams per cold start = 415 grams
2 cold starts/day * 350 days * 0.1442 NOx grams per cold start = 101 grams
516 grams

# Cold start emissions saved are substantial

Cold Start emissions saved
NEVs save 2 cold starts per day over ULEV II

2 cold starts/day * 350 days * 0.5928 NMOG grams per cold start = 415 grams
2 cold starts/day * 350 days * 0.1442 NOx grams per cold start = 101 grams
516 grams

15,000 NEVs eliminate 7,740,000 grams ozone precursors a year

8.53 tons per year

# Overall conclusions

Specific:

- NEVs are used every day (average 3.5 to 8.1 trips/day).
- NEVs replace ICE cars and trucks daily, on average, two of every three vehicle trips.
  - >75% of all NEV trips are 3 miles or less; 40 – 50% are 1 mile or less.
  - **On average, over two cold starts per day are eliminated per NEV.**
- NEV trips are seen by owners as “trips of necessity” and would have been taken anyway.
- NEVs are found in a wide variety of land use classifications.

General:

- The NEV fleet in California has grown to represent the largest concentration of battery electric vehicles anywhere in the World.
- NEVs are an established part of the various modes of personal and commercial/small fleet transportation in California.

# Recommendations

- Create NEV purchase incentive program

| | | |
|---|---|---|
| $1,000 / NEV | x $1 m | = 1,000 NEVs |
| | x $2 m | = 2,000 NEVs |
| | x $10 m | = 10,000 NEVs |

- Sponsor statewide legislation similar to AB 2353 (making City of Lincoln a NEV-friendly community)

End